



Philadelphia University

Faculty of Engineering - Department of Communications and
Electronics Engineering

Course Information

Title: Digital Communications (0650425)

Prerequisite: Analog communication

Credit Hours: 3 credit hours (16 weeks per semester, approximately 44 contact hours)

Textbook: "Communication Systems" 4th Edition, Simon Haykin , 2000, John Wiley & Sons, Inc.

- References:**
- 1) Bernard Sklar;" Digital Communications Fundamentals and Applications",2nd Edition2001, Prentice-Hill international , INC
 - 2) Leon W. Couch;" Digital and Analog Communication Systems", 6th Edition,2001,Prentice-Hill international , INC.
 - 3) B.P. Lathi; "Modern Digital and Analog Communication Systems",3rd Edition 2010 , Oxford University Press,INC
 - 4) Martin S. Roden;"Analog and Digital Communication Systems",4th Edition,2000,Prentice-Hall international , INC.
 - 5) Matlab Tutorials (<http://www.mathworks.com/>)

Catalog Description: The course is a requirement for all engineering students. It introduces the principles of digital communications to make the student able to understand the communication system with zoom in digital form of electronics.

Course Topics

| Week | Topic |
|---------|--|
| 1 | Review and Introduction to digital communication system |
| 2, 3, 4 | Sampling, quantization, encoding, PCM, line code, TDM, DPCM and DM |
| 5, 6 | Probability of error due to noise, Matched Filter, Intersymbol Interference (ISI). |
| 7, 8 | ISI solution, equalizer filter & Baseband M-ary PAM transmission |
| 9 | Geometric Representation of Signals and Correlation Receiver |
| 10, 11 | Digital Modulation Techniques /ASK and PSK/ DPSK Effect of Noise on Digital Modulation Signals |
| 12, 13 | Digital Modulation Techniques / QAM Effect of Noise on Digital Modulation Signals |
| 14 | Digital Modulation Techniques (FSK). Effect of Noise on Digital Modulation Signals, non-coherent FSK). Effect of Noise on Digital Modulation Signals |
| 15 | Comparisons and Projects discussion. Introduction to channel coding (optional) |
| 16 | Final Examination |

Course Learning Outcomes and Relation to ABET Student Outcomes:

Upon successful completion of this course, a student should be able to:

| | | |
|----|--|--------|
| 1. | Understand how analog waveforms can be converted to digital waveforms using different techniques. | [a, e] |
| 2. | Design and implement the appropriate filters to combat the degradation effect of the channel noise, the ISI and their combined effect. | [c, e] |
| 3. | Expand signals over an orthogonal set of basis functions, construct the corresponding signal space diagram and understand the basics of signal-space analysis. | [a] |
| 4. | Identify the format of pass-band digital modulation schemes and specify the appropriate detectors for each modulation scheme. | [a, e] |
| 5. | Compare between different modulation schemes based on several criteria. | [a, e] |

Assessment Instruments:

Evaluation of students' performance (final grade) will be based on the following categories:

Exams: Two written exams will be given. Each will cover about 3-weeks of lectures

Quizzes: 10-minute quizzes will be given to the students during the semester. These quizzes will cover material discussed during the previous lecture(s).

Homework: Problem sets will be given to students. Homework should be solved individually and submitted before the due date.

Copying homework is forbidden, any student caught copying the homework or any part of the homework will receive zero mark for that homework

Participation: Questions will be asked during lecture and the student is assessed based on his/her response

Final Exam: The final exam will cover all the class material.

Grading policy:

| | |
|---------------------------|-----|
| First Exam | 20% |
| Second Exam | 20% |
| Homework | 8% |
| Quizzes and participation | 12% |
| Final Exam | 40% |

Total: 100%

Attendance policy:

Absence from classes and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse, acceptable to and approved by the Dean of the relevant college/faculty, shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.